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# EZGPM01

## GPS RECEIVER

**Product Information Data Sheet**

**MARCH 2004**

## Device features

- Fully self-contained 12 channel GPS receiver
- Fully EMI shielded
- SiRFstar™ IIe/LP architecture
  - GRF2i/LP RF front-end IC
  - GSP2e/LP GPS Engine with Integrated Processor
- SBAS(Satellite Based Augmentation System) support
- Fast time-to-first-fix
- 8Mbit Flash memory
- Built-in Low-noise amplifier
- Advanced low power modes
- Operating Voltage 3.3V
- Battery supply pin for internal backup memory and real time clock
- Passive and active antenna support
- Active antenna bias supply voltage pin
- Active antenna overcurrent protection
- Industrial operating temperature range -40°C …85°C
- Very compact : 25.4 X 25.4 X 3 mm

### General Description

The EZGPM01 GPS Receiver is a fully self-contained single-board 12 channel parallel receiver module intended as a component for OEM Global Positioning System(GPS).

Based on the SiRFstar™IIe/LP architecture, the module provides complete GPS signal processing, thus providing accurate satellite position data.

The EZGPM01 is a completely shielded module.

### Applications

- Navigation
- Aviation
- Automotive applications
- Location Based Services
- Timing applications

## Key Features

### Industry Leading GPS Performance

- Builds on the high performance SiRFstar™IIe/LP core
- High-speed signal acquisition using 1920 time/frequency search channels
- SBAS(Satellite Based Augmentation System) support

### Low Power GPS Architecture

- Extreme low power in power-down mode, but capable of very fast starts

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## Maximizes GPS Position Availability

- SingleSat™ updates in reduced visibility
- Superior urban canyon performance
- FoliageLock™ or weak signal tracking

## Multiple Operating Modes

- Continuous Mode
- TricklePower™ Mode
- Push-to-Fix™ Mode

## Block Diagram

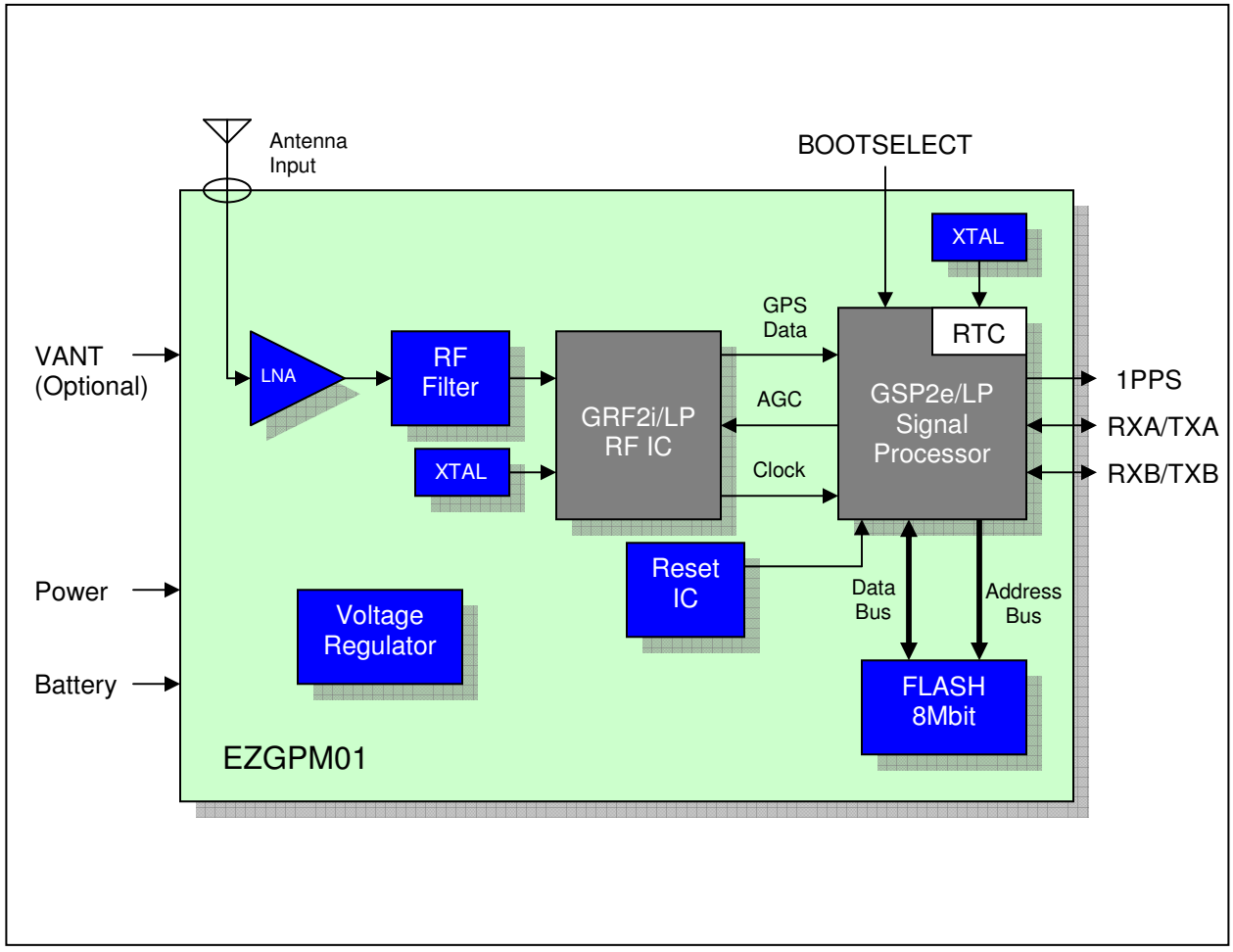


**Figure 1**: EZGPM01 Block Diagram

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## Mechanical Drawing

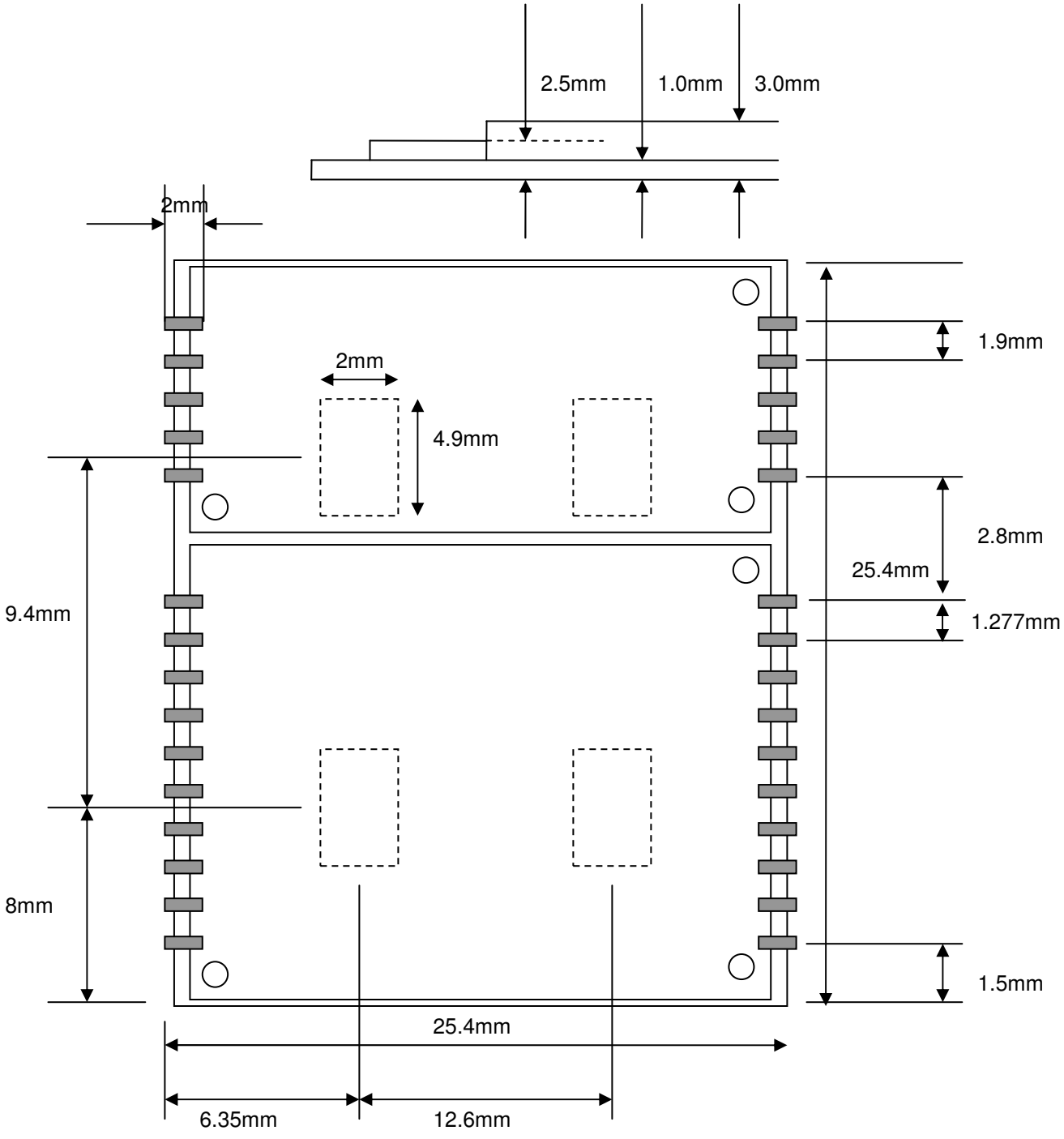


**Figure 2**: EZGPM01 recommendations for layout and pads

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## Device Terminal Functions

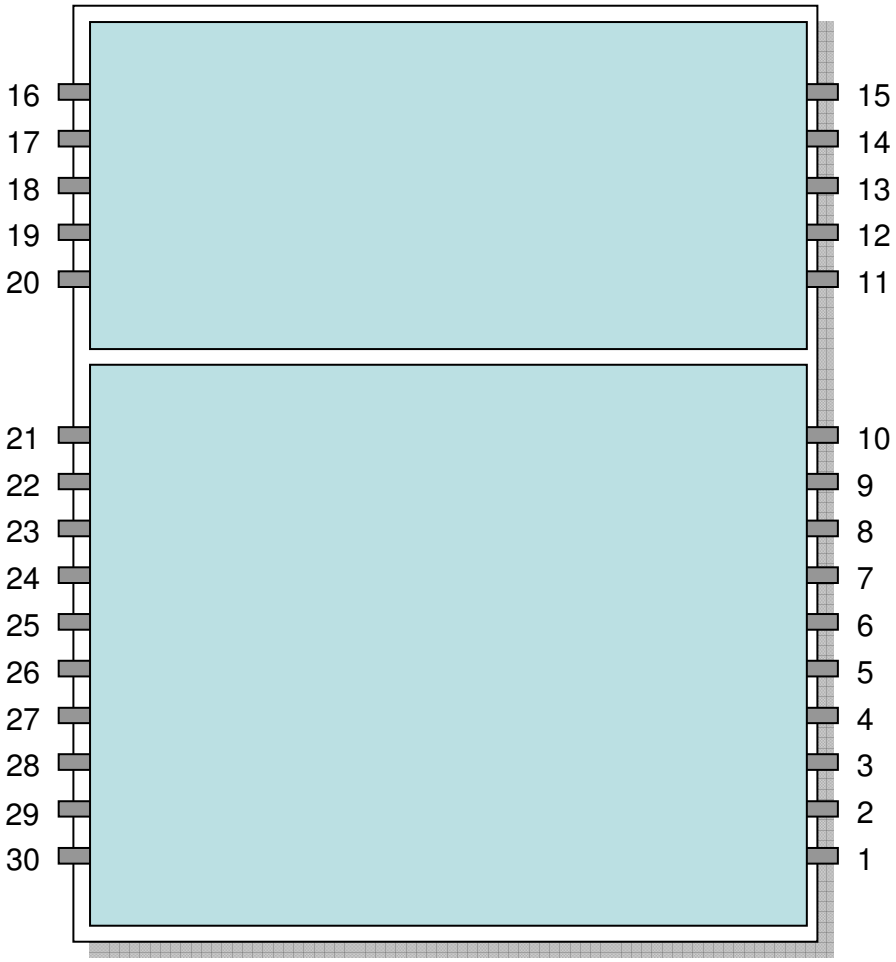


**Figure 3**: EZGPM01 Terminals

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| Terminal | Terminal Name | I/O | Description |
|---|---|---|---|
| 1 | VCC | I | 3.3V DC supply voltage |
| 2 | DGND | | Digital ground |
| 3 | BOOTSELECT | I | Boots in update mode when high |
| 4 | RXA | I | Serial Data Input A |
| 5 | TXA | O | Serial Data Output A |
| 6 | TXB | O | Serial Data Output B |
| 7 | RXB | I | Serial Data Input B |
| 8 | GPIO3 | I/O | |
| 9 | RF_ON | O | Indicates RF part is ON |
| 10 | DGND | | Digital ground |
| 11 | AGND | | Analog ground |
| 12 | AGND | | Analog ground |
| 13 | AGND | | Analog ground |
| 14 | AGND | | Analog ground |
| 15 | AGND | | Analog ground |
| 16 | AGND | | Analog ground |
| 17 | RF_IN | I | Antenna input |
| 18 | AGND | | Analog ground |
| 19 | V_ANT | I | Supply for active antenna |
| 20 | VCC_RF | O | 2.85V output of RF section |
| 21 | V_BAT | I | External backup battery |
| 22 | RESET_N | I | Resets the module when low |
| 23 | GPIO10 | I/O | |
| 24 | GPIO6 | I/O | |
| 25 | GPIO5 | I/O | |
| 26 | GPIO7 | I/O | |
| 27 | GPIO0 | I/O | |
| 28 | GPIO1 | I/O | |
| 29 | T-MARK(1PPS) | O | One-pulse-per-second |
| 30 | DGND | | Digital ground |

**Table 1**: Device Terminal Functions

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## Electrical Characteristics

**Absolute Maximum Ratings**

| Parameter | Symbol | Min | Max | Units |
|---|---|---|---|---|
| Power Supply Voltage | Vcc | | 6 | V |
| Input Pin Voltage | Vin | | 5 | V |
| Antenna Bias Current | Iant | | 100 | mA |
| Storage Temperature | Tstg | -55 | +125 | ºC |

**Table 2**: Absolute Maximum Ratings

**Operating Conditions**
$T_A$ = 25ºC; 3V active antenna

| Parameter | Symbol | Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Power Supply Voltage | Vcc | | 3.0 | 3.3 | 6 | V |
| Backup Battery Voltage | Vbat | | 2.5 | 3.0 | 3.6 | V |
| Antenna Bias Voltage | Vant | | 2.0 | 3.0 | 12 | V |
| Supply Current | Icc | Vcc = 3.3V | | 67 | | mA |
| TricklePower Supply Current | Itps | Vcc = 3.3V; 20% duty cycle; 1 sec update period | | 16.5 | | mA |
| Standby Battery Current | Ibat | Vbat = 3.0V | | 3.8 | | µA |
| Antenna Bias Current | Iant | Vant = 3.0V | | 18 | | mA |
| Operating Temperature | Topr | | -40 | | 85 | ºC |

**Table 3**: Operating Conditions

**Electrical Specifications**

| | |
|---|---|
| **General** | |
| Frequency | L1, CA code, 1575.42 MHz |
| CA Code | 1.023 MHz chip rate |
| Channels | 12 |
| | |
| **Sensitivity** | |
| Holding Sensitivity(C/N ave. 26dB-Hz) | -144dBm |
| | |
| **Accuracy** | |
| Position | 10 meters CEP (SA off) |

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| | |
|---|---|
| Velocity | 0.1 meters/second (SA off) |
| Time | 1 μsec synchronized to GPS time |
| | |
| **DGPS Accuracy** | |
| Position | < 5 meters (SA off) |
| Velocity | 0.05 meters/second, typical |
| | |
| **Datum** | WGS-84 |
| | |
| **Time-To-First-Fix** | |
| Reacquisition | 100ms |
| SnapStart™ | < 3 seconds |
| Hot Start | < 8 seconds |
| Warm Start | < 38 seconds |
| Cold Start | < 45 seconds |
| | |
| **Serial Port** | |
| Electrical Interface | 2 full duplex serial communication |
| Protocol support | NMEA, SiRF binary, RTCM SC-104 |
| | |
| **Time – 1PPS** | |
| Level | CMOS |
| Pulse Duration | 100 ms |
| Time Reference | At the pulse positive edge |
| Measurement | Aligned to GPS second |

**Table 4**: Electrical Specifications

## Operating Modes

### TricklePower™ Description

The TricklePower™ mode provides the lowest average power dissipation by powering down the module after a position fix. It cycles through three states: tracking state(or full power), cpu state, and trickle state.

The receiver is in the full power tracking state when it is first turned on, after a system reset, and when the internal RTC wakeup interrupt is generated. Satellite search, initial acquisition, initial position calculation, and tracking measurements are always taken in full power.

In the CPU state, the RF antenna section and GPS clock has been turned off, although the RTC keeps running. The CPU would keep running to process the GPS data until a position fix is determined and the result has been transmitted by the serial communication interface.

The trickle state is a low power standby state in which the CPU clock and RF circuits are turned off but power is still applied to the baseband. After a set amount of time, the receiver wakes up, makes a reset and tries to acquire satellites.

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### Push-to-Fix™ Description

The push-to-fix™ mode puts the receiver into a background duty cycle mode that provides a periodic refresh of position, GPS time, ephemeris data, and RTC calibration every 30 minutes. The push-to-fix mode sets the receiver in a background duty cycle consisting of 30 seconds of On time in the tracking state at full power, followed by a position computation in the CPU state, followed by approximately 29.5 minutes in the trickle state.

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## Application Circuit

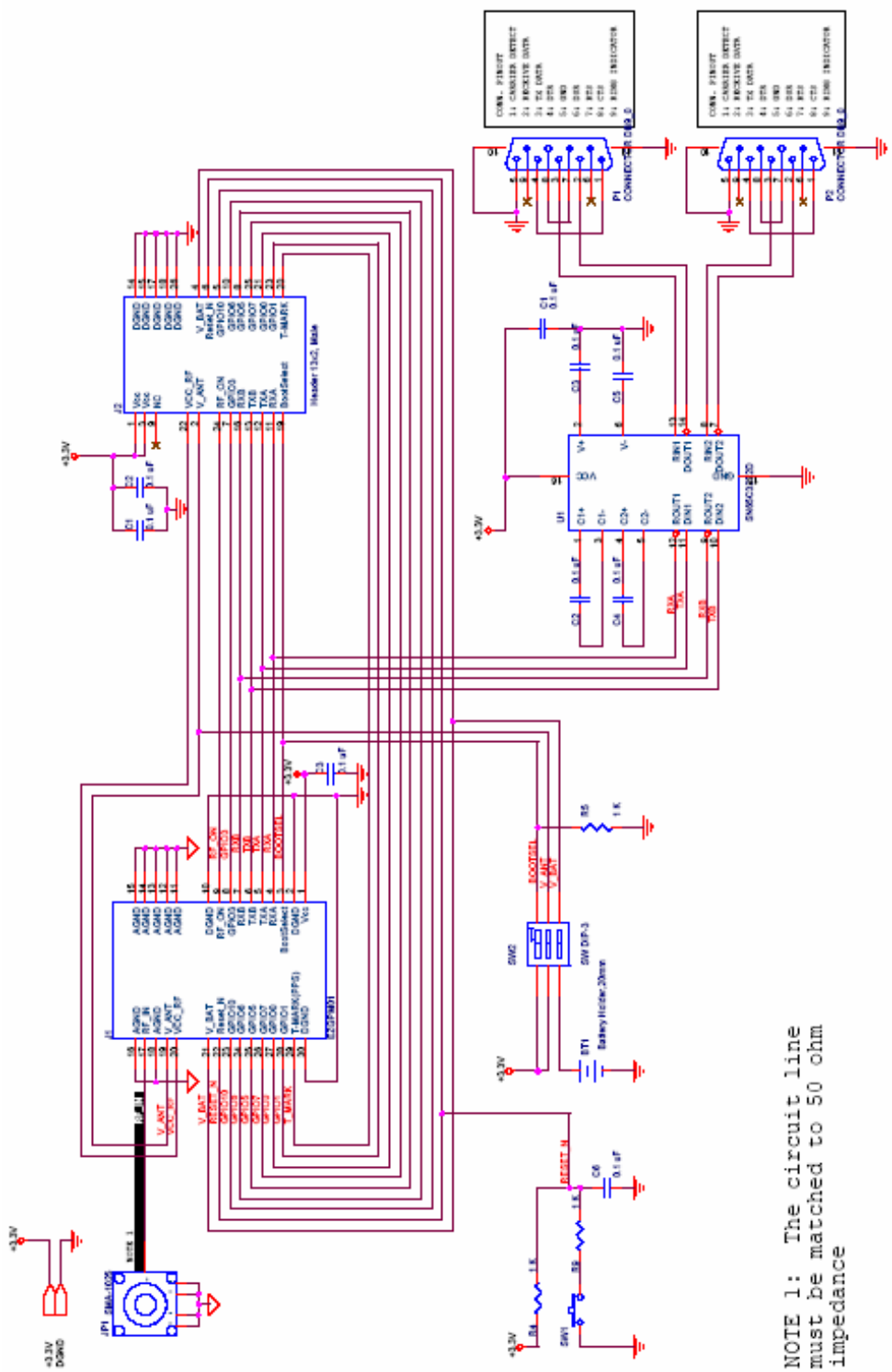


**Figure 4**: EZGPM01 Reference Design

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## Ordering and Contact Information

| Order Number | Description |
|---|---|
| EZGPM01 | MOQ is 1k. Leadtime: 12-16 weeks |

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